

CATALOGUE

The following bulletins comprise the Catalogue of the University:

- PART I *Scholarships, Fellowships, Teaching Assistantships, Assistantships
Loan Funds, Prizes—Main University*
- PART II *College of Pharmacy*
- PART III *College of Business Administration*
- PART IV *College of Engineering*
- PART V *General Information, Main University*
- PART VI *College of Arts and Sciences*
- PART VII *Graduate School*
- PART VIII *School of Law*
- PART IX *Medical Branch**
- PART X *College of Fine Arts*
- PART XII *Dental Branch†*
- PART XIII *College of Education*
- PART XIV *The Southwestern Medical School‡*
- PART XV *School of Architecture*

* Part IX, catalogue of the Medical Branch, is distributed by the office of the Dean of the Medical Branch, Galveston.

† Part XII, catalogue of the Dental Branch, is distributed by the office of the Dean of the Dental Branch, Houston.

‡ Part XIV, catalogue of The Southwestern Medical School, is distributed by the office of the Dean of The Southwestern Medical School, Dallas.

GENERAL PURPOSE OF THE CATALOGUE

The Catalogue Parts of the Main University are intended to give general information, to record the work of the biennium about to close (except Part VI) and to make announcements for the ensuing period specified in each case.

As to the courses to be offered the following Long Sessions, the Catalogue contains only a preliminary announcement and is superseded by the *Final Announcement of Courses*, printed each semester.

The Catalogue contains the official regulations. Except as to degrees requirements, these regulations are not valid beyond the period specified on the cover page.

CATALOGUE NUMBER: PART VI

College of ARTS AND SCIENCES

1953-1954 and 1954-1955

WITH ANNOUNCEMENTS FOR

1955-1956 and 1956-1957



THE UNIVERSITY OF TEXAS

AUSTIN, TEXAS

Dept M & Astro.

(combined 2
prev. dep'ts
in 1953-54)

Graduate degrees are offered in the Graduate School. For the requirements of the degrees of Doctor of Philosophy, Doctor of Education, and all master's degrees except the Master of Laws degree, see the catalogue of the Graduate School. The requirements for the Master of Laws degree are given in the catalogue of the School of Law.

GENERAL REQUIREMENTS

1. No honorary degree will be conferred by The University of Texas.
2. No degree will be conferred except on dates publicly announced.
3. It is desired that each candidate attend the Commencement at which his degree is to be conferred.
4. No degree will be conferred without a residence in the Main University of at least two long-session semesters, or an equivalent period of residence, and the completion in residence of at least thirty semester hours in courses offered in the College of Arts and Sciences counting toward the degree.
5. At least twenty-four of the last thirty semester hours offered for an undergraduate degree must be taken in the Main University, but not necessarily in residence. In the case of the Degree of Bachelor of Arts, Plan III, Scheme I, and Plan IV, Scheme II, this rule applies to the academic work.
6. Of the courses offered for any undergraduate degree, at least six semester hours in advanced courses in the major subject must be completed in residence at the Main University.
7. Not more than 30 per cent of the semester hours required for any degree offered in the College of Arts and Sciences may be done by correspondence.
8. No second bachelor's degree will be conferred until the candidate has completed at least twenty-four semester hours in addition to those counted toward the bachelor's degree which requires the highest number of semester hours of credit.
9. A candidate for a degree must (1) register in the University in the College of Arts and Sciences in the long-session semester or in the Summer Session in which he is to receive the degree; and (2) apply for the degree by filing a "Diploma Name Card" with the Dean not later than one month before the closing date of the semester or term in which the degree is to be granted.
10. Seniors will not be approved for graduation unless they have complied with the regulations regarding required health and physical education. See the General Information bulletin.
11. An Air Force or Army Reserve Officers Training Corps student who elects the basic and/or advanced program in air science or military science will not be approved for graduation until his Government contract is completed, unless such student is released from the ROTC. (See the sections describing the Air Force and Army Reserve Officers Training Corps in the General Information bulletin.)
12. Courses in air science, military science, and naval science may be counted for degree credit as tabulated on pages 26 and 27 of this catalogue.

GRADUATION UNDER A PARTICULAR CATALOGUE

A student may obtain a degree in the College of Arts and Sciences according to the requirements of the catalogue under which he enters the Main University or the catalogue governing any subsequent year in which he is registered in the College of Arts and Sciences.

A student registering for the first time in the Main University in the Summer Session may obtain a degree in the College of Arts and Sciences according to the requirements of either the catalogue applying to the previous Long Session or the one for the next Long Session.

A student completing in the Division of Extension, either in extension classes by correspondence or in both ways together, by March 1 of any year, at least twelve semester hours of work counting toward a degree in the College of Arts and Sciences may obtain that degree in accordance with the requirements of the catalogue applying to that year.

All of the above provisions, however, are subject to the restriction that all the requirements for a degree in the College of Arts and Sciences must be completed within six years of the date of the catalogue chosen.

A student who leaves school to enter military service and who upon returning chooses to graduate under a catalogue in effect for him prior to his entry into military service must complete all requirements for a degree within six years of the date of the catalogue chosen, exclusive of time spent in the service during a period of emergency.

A student may always graduate under the current catalogue.

APPLYING FOR A DEGREE

To apply for a bachelor's degree, the applicant

(a) Must file with the Dean a "Degree Card" not later than March 1 of his senior year. A student who intends to take a bachelor's degree in combination with law or medicine should apply for a "Degree Card" in the second semester of his sophomore year. The "Degree Card" is a photostatic copy of the applicant's record and will be prepared in the Registrar's office upon the request of the applicant and the payment of fifty cents to cover the cost of photostatting the record.

Attention to this matter will save the student trouble and delay in registration.

(b) Must register in the University at the beginning of his senior year with the Dean and fill out a "Diploma Name Card" at the last registration before graduation, giving the date of graduation.

No degree will be conferred unless a "Diploma Name Card" applying for the degree has been filed with the Dean. A "Diploma Name Card" should be filed at the last registration before graduation, but it must be filed not later than one month before the closing date of the semester or term in which the degree is to be granted.

In advising and in registering students, the Dean and his assistants try to prevent errors. Avoidance of errors is the main purpose of the "Degree Card." The student himself is expected to remember that graduation is attained

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according to some one catalogue, is expected to study the requirements set forth in that one catalogue, and to register in accordance therewith. *He finally registers entirely at his own risk.*

REQUIREMENTS FOR THE DEGREE OF BACHELOR OF ARTS

PLAN I

A. Prescribed Work

1. Twelve semester hours of English (English 601 or 601Q, and six semester hours of sophomore English).
2. Six semester hours of mathematics, or Greek 406 and 407, or six semester hours of Latin other than Latin 406. (A student who begins Latin in the University should take Latin 406, 407, and 311.) Some majors do not permit substitution. See requirements under "C. Majors and Minors." A student who offers courses in one of the classical languages in satisfaction of this requirement may not offer the same courses toward the satisfaction of Requirement 3.
3. Foreign language: The foreign language requirement is the attainment of a certain proficiency rather than the completion of a specified number of hours. Completion of courses 406 and 407 in a foreign language and six semester hours of work beyond that level in the language, generally course 612, or such portion thereof as may be required by the score on the placement test meets the requirement. A student offering Latin must take at least twelve hours of Latin, regardless of the score made on the placement test. A student who chooses a major in the Latin American Institute must take Spanish or Portuguese (see the bulletin of the Institute of Latin American Studies). For the special foreign language requirement for the Eastern European Studies program, see "Eastern European Studies" under "C. Majors and Minors."

If a Romance language is used in meeting this requirement, any student with a knowledge of the language, however acquired, may absolve the requirement by passing, with a grade of at least B, the final examination in the highest course called for by the requirement. Application for such a final examination must be made to the Chairman of the Department of Romance Languages before a regularly scheduled period of final examinations.
4. Twelve semester hours in the natural sciences, including (a) six semester hours in a laboratory course in physical science (chemistry or physics), or Physics 609; and (b) Biology 607 or Geology 601 or Zoology 311K and 316K. Special departmental requirements will be found under "C. Majors and Minors."
5. Six semester hours in American government (Government 610).
6. Six semester hours in United States history (History 615 or six advanced semester hours in United States history).
7. The requirements set down below under "C. Majors and Minors."
8. Thirty-six semester hours of advanced courses. (See "Course numbers" in the General Information bulletin.) Not more than twelve of the thirty-six semester hours of advanced courses of this requirement may be taken outside of the College of Arts and Sciences.

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For a student who chooses a major in Latin American Studies, eighteen of the thirty-six semester hours of advanced courses must be from Latin American content courses.

A. At least eighteen semester hours of advanced courses, including six semester hours of advanced courses in the major subject must be completed in residence at the Main University.

B. Enough courses to make a total of 120 semester hours. At least twelve semester hours of elective work must be taken in subjects outside the major and minor fields. Not more than thirty-six semester hours may be counted in one subject, not more than twelve semester hours in work offered by the Association of Religious Teachers, or their equivalent done elsewhere; not more than twenty-five semester hours in any one of the following semiprofessional or professional subjects or more than thirty semester hours in any combination of them: home economics, journalism, architecture, business administration, education, engineering, fine arts, law, library science, air science, military science, naval science, pharmacy.

B. Special Requirements

1. The student must make (a) an average of at least fifteen points per semester hour on the courses taken at the University which are required and counted toward the degree, and (b) an average of at least fifteen points per semester hour on the courses taken at the University and counted as the major subject. In addition, majors in speech are required to make an average of at least fifteen points per semester hour on the courses other than speech taken at the University which are required and counted toward the degree. (See "C. Majors and Minors" below.) An A grade on a semester hour counts as 21 points; a B, as 18 points; a C, as 15 points; a D, as 12 points; and an F, as 0.

2. The student must, not later than three weeks before the end of the term in a semester in which he expects to take his degree, show such ability to write clear and correct English as to satisfy the Committee on Students' Use of English. To promote the habitual use of clear and correct English, the written work (theses, reports, quizzes, examination papers, etc.) of every student in all his courses is subject to inspection by the Committee. It is the duty of each member of the teaching staff to require that his students shall be careful in their use of English, to give due weight to the students' use of English in making up of papers, and to report promptly to the Committee, submitting the evidence, any student whose use of English is seriously defective. If any student be found deficient, the Committee will prescribe for him such work as in its judgment is proper, and this work must be done to the satisfaction of the Committee before the student can obtain his degree.

C. Majors and Minors

The student is advised to choose his major subject as early as possible in his college career but is not required to do so until the beginning of his junior year. Before registering for advanced courses in his major subject or in a related subject, a student is strongly advised to consult the chairman of his major department.

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The student will note that it is possible to arrange his minors and electives as to take in effect two majors. Such an arrangement is especially desirable for those who wish to teach two subjects.

Courses in business administration, education, engineering, fine arts, law, library science, pharmacy, air science, military science, and naval science do not count as majors and may not count as minors except as specified below.

Any course taken to meet the requirements under "A. Prescribed Work" counts also toward satisfying the major and minor requirements, unless otherwise specified below.

At least eighteen semester hours of advanced courses, including six semester hours of advanced courses in the major, must be completed in residence at the Main University.

Students who wish to major in subjects which by their nature involve the work of more than one department may follow special majors programs made up by faculty representatives from those departments whose work is involved and approved by the Dean.

In general, the major and minor requirements are as follows:

Major: Twenty-four semester hours in one of the subjects listed below, of which at least twelve must be in advanced courses. **No freshman course may be counted in fulfillment of the major requirement unless specifically authorized by the major department.**

Minors as listed under the major subject:

First Minor: Twelve semester hours in a field closely related to the major.

Second Minor: Six semester hours in another field supporting the major.

ANTHROPOLOGY

Major: Twenty-four semester hours of anthropology, of which at least twelve must be in advanced courses. Anthropology 301 and 302 may be counted toward the major.

First Minor: Twelve semester hours of classical civilization, economics, geography, geology, government, history, philosophy, psychology, sociology, or zoology; or, with written consent of the Departmental Chairman and approval of the Dean, twelve semester hours in another subject.

Second Minor: Six semester hours in a subject listed above which is not offered as the first minor; or, with written consent of the Departmental Chairman and approval of the Dean, six semester hours in another subject not offered as the first minor.

ASTRONOMY

Major: Eighteen semester hours of astronomy above freshman rank, of which at least fifteen must be in advanced courses, and six semester hours of mathematics.

Minor: Twelve semester hours of physics to be chosen from the following courses: Physics 325, 326, 335, 339, 468 (or 433).

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BACTERIOLOGY

Major: Biology 607 and twenty-four semester hours of bacteriology above freshman rank, of which at least twelve must be in advanced courses. Students interested in medical technology should consult the medical technology adviser for bacteriology.

First Minor: Twelve semester hours of chemistry.

Second Minor: Six semester hours of botany, education, physics, or zoology; or an additional semester hours of chemistry.

BOTANY

Major: Twenty-four semester hours of botany above freshman rank, of which at least twelve must be in advanced courses.

First Minor: Twelve semester hours of anthropology, bacteriology, chemistry, geography, geology, philosophy, physics, mathematics, zoology, or education.

Second Minor: Six semester hours in a subject listed above which is not offered as the first minor.

CHEMISTRY

Mathematics 613 or 613E and either Physics 801 or Physics 401 and 812 are required of all students majoring in chemistry.

Major: Chemistry 801; 812; 810, or 621 and 426; and 453.

First Minor: Twelve semester hours of bacteriology, botany and/or zoology, geology, mathematics, or physics; or, with written consent of the Departmental Chairman and approval of the Dean, twelve semester hours in a subject offered outside the College of Arts and Sciences.

Second Minor: Six semester hours in a subject listed above which is not offered as the first minor.

CZECH

Major: Twenty-four semester hours of Czech, of which at least twelve must be in advanced courses. Czech 406 and 407 may be counted in fulfillment of the requirement.

First Minor: Six semester hours of sophomore or advanced courses in a second foreign language.

Second Minor: Six semester hours of advanced courses in English, or a social science (anthropology, economics, geography, government, history, philosophy, psychology, sociology), or linguistics, or a natural science.

EASTERN EUROPEAN STUDIES

A student concentrating in Eastern European Studies is strongly advised to consult the Chairman of the Program for advice in working out his schedule.

Major: The student must satisfy the *Major* requirement as set down under Economics (p. 34), or Geography (p. 35), or Government (p. 36), or History (p. 36). Courses in the chosen major which are listed below as required for Eastern European Studies will also count toward the major requirement.

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GOVERNMENT

Major: Twenty-four semester hours of government, of which at least fifteen must be in advanced courses. Either Government 301 or 302 may be counted toward the major.

First Minor: Twelve semester hours, of which six must be advanced, in anthropology, economics, history, philosophy, or sociology; or, with written consent of the Departmental Chairman and approval of the Dean, twelve semester hours of business administration, geography, journalism, or psychology.

Second Minor: Six semester hours in (a) a subject listed above which is not offered as the first minor or (b) in classical civilization with the approval of the Chairman of the Department of Government.

GREEK

Major: Twenty-six semester hours of Greek, as follows: (a) *Classical Greek Program:* 406, 407, 612, 624, and 665; or (b) *New Testament and Hellenistic Greek Program:* 406, 407, 619, 628, and 661 or 662. Students entering with credits in Greek should consult the course section of this catalogue.

First Minor: Twelve semester hours in either a second foreign language, preferably Latin, or in advanced English and/or advanced linguistics.

Second Minor: Six semester hours of advanced courses selected from: classical civilization, ancient history, Government 356K or 361, Philosophy 329K.

HISTORY

Major: Twenty-four semester hours of history, of which at least twelve must be in advanced courses. Freshman courses may be counted in fulfillment of the major requirement.

First Minor: Twelve semester hours, of which six must be advanced, in a second social science (anthropology, economics, geography, government, philosophy, psychology, or sociology), classical civilization, English, or a modern or ancient language. Students are invited to propose combinations of their own to the Departmental Chairman, or to the designated undergraduate adviser, who may, with the approval of the Dean, permit substitutions from any college of the University.

Second Minor: Six semester hours in a subject listed above, of which three must be advanced.

HOME ECONOMICS

Major: Twenty-four semester hours of home economics, of which at least twelve must be advanced. Six semester hours of freshman courses may be counted in fulfillment of the major requirement.

First Minor: Twelve semester hours of anthropology, bacteriology, botany, chemistry, economics, physics, psychology, sociology, or zoology.

Second Minor: Six semester hours of architecture, art, business administration, education, or journalism; or six additional semester hours in a subject chosen as the first minor.

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Major: Twenty-eight semester hours of Latin, as follows: 406, 407, 210, 311, 312, 623, and 665. Students entering with credits in Latin should consult the Chairman of the Department of Classical Languages.

First Minor: Twelve semester hours in either a second foreign language, preferably Greek, or in advanced English and/or advanced linguistics.

Second Minor: Six semester hours of advanced courses selected from: classical civilization, ancient history, Government 356K or 361, Philosophy 329K.

LATIN AMERICAN STUDIES

Major: Twenty-four semester hours in one of the following: anthropology, economics, geography, geology, government, history, Spanish. Eighteen of these twenty-four semester hours must be in advanced courses, including at least twelve hours in Latin American content courses.

No freshman course may be counted in fulfillment of the major requirement except the following: Anthropology 301, 302; Economics 302, 303; Geography 301 and 302, or 303 and 304; History 604, 609.

Minor: Twelve semester hours in one of the fields listed above which was not chosen as the major, or twelve semester hours in either business administration or education. At least six of these twelve semester hours must be in Latin American content courses, and the other hours must be in Latin American related courses.

For information concerning Latin American content courses and related courses, see the bulletin of the Institute of Latin American Studies.

LINGUISTICS

All students majoring in linguistics must satisfy the prerequisite for junior courses in at least two foreign languages.

Major: Twenty-four semester hours including (1) Phonetics 403 or English 344M or 344K; (2) nine semester hours above the level of course 406 in a foreign language other than the minor; (3) Linguistics 620; and (4) (a) for *Descriptive Linguistics*, six semester hours selected from: English 360K, 364K, 364M; French 371; German 369; Linguistics 361, 362; Spanish 371K; or (b) for *Historical Linguistics*, six semester hours selected from: English 364L, 364M; French 373; German 368; Greek 661, 662, 665; Latin 260, 665; Linguistics 361; Portuguese 373; Spanish 373. (Note the prerequisite for these senior courses.)

First Minor: Twelve semester hours of anthropology, geography, Greek, Latin, modern foreign language, psychology, or speech; or twelve semester hours of English, of which six must be advanced.

Second Minor: At least six semester hours in another foreign language or in a subject listed above which is not offered as the first minor.

MATHEMATICS

Major: Twenty-four semester hours of mathematics above freshman rank, of which at least twelve must be in advanced courses; or fifteen semester hours of

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mathematics, including at least three hours of advanced courses, and nine hours of advanced astronomy.

Minor: Twelve semester hours of at least sophomore rank in a second subject offered in the Colleges of Arts and Sciences, Business Administration (excluding Secretarial Studies 304 and 305), Education, or Engineering.

PHILOSOPHY

Major: Twenty-four semester hours of philosophy above freshman rank, of which at least twelve must be in advanced courses.

First Minor: Twelve semester hours in a second social science (anthropology, economics, geography, government, history, psychology, or sociology), or with written consent of the Departmental Chairman and approval of the Dean, twelve semester hours in a subject other than a social science.

Second Minor: Six semester hours in a third social science; or, with written consent of the Departmental Chairman and approval of the Dean, six semester hours in a subject other than a social science.

PHYSICS

Students majoring in physics must take at least twelve semester hours in mathematics, including Mathematics 613 or 613E, and Chemistry 801.

Major: Twenty-four semester hours of physics above freshman rank, of which at least sixteen must be in advanced courses.

First Minor: Twelve semester hours of mathematics or chemistry.

Second Minor: Six semester hours of mathematics (if not counted as the first minor), botany, chemistry (if not counted as the first minor), geology, or zoology.

Not more than eight semester hours of freshman courses may be used in satisfying the minor requirements.

PSYCHOLOGY

Psychology majors must take six semester hours of mathematics.

Major: Twenty-four semester hours of psychology above freshman rank, of which at least twelve must be in advanced courses. (Psychology 610K is strongly recommended.)

First Minor: Twelve semester hours of anthropology, chemistry, educational psychology, management, mathematics, philosophy, physics, sociology, or zoology.

Second Minor: Six semester hours in a subject listed above which is not offered as the first minor.

SOCIOLOGY

Major: Twenty-four semester hours of sociology, including Sociology 302 (or 310) or 322 and at least twelve advanced hours, of which six must be of senior rank. Six semester hours of freshman courses in sociology may be counted in fulfillment of the major requirement. Not more than six semester hours in courses offered in other departments or schools of the University which count as sociology under certain conditions may be counted in fulfillment of the major requirement.

First Minor: Twelve semester hours, of which six must be advanced, of an-

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thropology, economics, geography, government, history, philosophy, or psychology, or, with written consent of the Departmental Chairman and the approval of the Dean, twelve semester hours in a subject not listed above.

Second Minor: Six semester hours in a subject listed above which is not offered as the first minor.

SPANISH

Major: Spanish 406, 407, 612, 218 (or the equivalent), and at least twelve semester hours of advanced courses in Spanish. A student who fails to pass Spanish VI with a grade of A or B is required to present at least sixteen semester hours of advanced courses in Spanish. Only such portion of the freshman and sophomore courses need be taken as may be required by the score on the placement test.

First Minor: Six semester hours of sophomore or advanced courses in a second foreign language.

Second Minor: (a) Six additional semester hours of advanced courses in this second foreign language, or (b) at least three semester hours of a sophomore course in a third foreign language, or (c) six semester hours of advanced courses in English, or (d) six semester hours of advanced courses in classical civilization, linguistics, or in a social science (anthropology, economics, geography, government, history, philosophy, psychology, or sociology).

SPEECH

Major: Thirty semester hours of speech, including Speech 305, 306, 050, six semester hours of sophomore courses, and fifteen semester hours of advanced courses, of which six hours are of senior rank.

Minor: (a) Drama 314; (b) six semester hours of advanced courses in English; and (c) six semester hours of advanced courses in any one of these subjects or combination of them: anthropology, classical civilization, economics, education, English, geography, government, history, journalism, linguistics, psychology, sociology.

ZOOLOGY

Major: Twenty-four semester hours of zoology above freshman rank, of which at least twelve must be in advanced courses.

First Minor: Twelve semester hours of bacteriology, botany, chemistry, geology, mathematics, physics, or psychology.

Second Minor: Six semester hours in a subject listed above which is not offered as the first minor; or, with written consent of the Departmental Chairman and approval of the Dean, six semester hours of education.

D. Rules Governing the Order and Choice of Work

FRESHMAN YEAR

1. The following work is recommended for the freshman year:

- English 601 or 601Q (prescribed for all students).
- Six semester hours of mathematics, or Greek 406 and 407, or six semester hours of Latin other than Latin 406. A student who offers

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369J. *Magazine Advertising: Writing, Art, and Production.*—Copy writing and lay-out-making for periodical advertising used by manufacturers in campaigns. Prerequisite: Six hours of advertising, including Advertising 342, 342J, or Journalism 342; or three hours of advertising, three hours of marketing, and Architecture 401a. Two lectures and two two-hour laboratories a week for one semester. Laboratory fee, \$2. Mr. Sharpe. (Prior to 1954-1955, given as Journalism 369M.)

371M. *Advanced Advertising.*—Determination of advertising objectives, coordination of advertising with other selling efforts, media selection, production planning, control, and measurement of results; case studies of problems. Prerequisite: Six hours of advertising or marketing and one of the following: Advertising 340, 340J, Journalism 340, Marketing 337; or graduate standing and consent of instructor. Three lectures a week for one semester. Mr. R. B. Thompson. (Prior to 1954-1955, given as Advertising 371.)

279J, 379J. *Problems in Advertising.*—Prerequisite: Ten hours of journalism, fourteen hours of advertising; and consent of instructor. Projects must be supervised by one of the journalism instructors. (Given for the first time in 1954-1955.)

LATIN

See Department of Classical Languages.

LINGUISTICS COURSES

For the requirements for the Bachelor of Arts degree with linguistics as a major, see page 37.

For Undergraduates and Graduates

620. *Introduction to Linguistic Science.*—Presents the current approach in linguistic study, especially as developed and carried on in this country. First semester: Analysis and presentation of languages; descriptive linguistics. Second semester: Development and change of languages; historical linguistics. Prerequisite: Six hours of sophomore English or foreign language. Three lectures a week for two semesters. Mr. Lehmann.

323. *Elementary Arabic.*—Prerequisite: Twelve hours of a foreign language or junior standing. Three lectures a week for one semester. (Not given in 1953-1954.)

324. *Elementary Arabic.*—Prerequisite: Linguistics 323 or three hours of advanced linguistics. Three lectures a week for one semester. (Not given in 1953-1954 or 1954-1955.)

361. *Phonetics and Phonemics.*—Articulatory and acoustic investigation of speech, with emphasis on analytic procedures; study of the function of speech sounds in specific linguistic structures. Prerequisite: Linguistics 620. Three lectures a week for one semester. Mr. Lehmann. (Not given in 1954-1955.)

362. *Field Methods in Linguistic Investigation.*—Recording and analysis of living languages as employed by native speakers of those languages, with emphasis on the phonemic and morphemic procedures involved in producing a grammar. Prerequisite: Linguistics 361. Three lectures a week for one semester. Mr. Lehmann. (Not given in 1954-1955.)

For Graduates

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62. *Sanskrit.*

63. *Introduction to Indo-European Linguistics.*

DEPARTMENT OF MATHEMATICS AND ASTRONOMY

PROFESSOR COOPER, Chairman

PROFESSOR EMERITUS M. B. PORTER; PROFESSORS Cleveland, Cooper, Craig, Ettinger, Moore, Vandiver, Wall; ASSOCIATE PROFESSORS Batchelder, Greenwood, Lane, Lubben, Titt; ASSISTANT PROFESSORS Edmonds, Guy, G. H. Porter, House.¹⁵

The Department of Applied Mathematics and Astronomy and the Department of Pure Mathematics were combined at the beginning of the 1953-1954 Long Session and the courses renumbered in one series. A list of the former numbers with the corresponding new numbers is given at the end of this department. In the courses listed below, the present numbers are followed by the former numbers in parentheses.

MATHEMATICS

For Undergraduates

301 (A.M. 307, P.M. 304). *College Algebra.*—Only one of the following may be counted: Mathematics 301, 301E; Applied Mathematics 307, 309, 309Q; Pure Mathematics 304. Three lectures a week for one semester.

301E (A.M. 309Q). *College Algebra.*—Designed for engineers and business administration students. Only one of the following may be counted: Mathematics 301E, 301; Applied Mathematics 307, 309, 309Q; Pure Mathematics 304. Three lectures a week for one semester.

303 (A.M. 308, P.M. 307). *Mathematics of Finance.*—Designed for business administration students. Prerequisite: Mathematics 301 or 301E. Three lectures a week for one semester.

304 (P.M. 301). *Plane Trigonometry.*—May not be counted by students who have admission credit in trigonometry unless their total number of acceptable admission units exceeds fifteen (however, see "Surplus Admission Units" in the General Information bulletin). Only one of the following may be counted: Mathematics 304, 204E; Applied Mathematics 204; Pure Mathematics 301. Three lectures a week for one semester.

204E (A.M. 204). *Brief Trigonometry.*—A two-hour course designed for engineers. Degrees in the College of Arts and Sciences require six hours of mathematics. Only one of the following may be counted: Mathematics 204E, 304; Applied Mathematics 204; Pure Mathematics 301. Two lectures a week for one semester.

304K (P.M. 301K). *Number Analysis.*—Designed for students registered under Plan II for the B.A. degree. Development of number concept, including angle numbers. Three lectures a week for one semester.

¹⁵ This list, for the sessions of 1953-1954 and 1954-1955, includes all staff members of professorial rank.

305 (P.M. 302). *Analytic Geometry*.—Only one of the following may be counted: Mathematics 305, 305E, 305K; Applied Mathematics 305; Pure Mathematics 302, 302K. Prerequisite: Trigonometry. Three lectures a week for one semester.

305E (A.M. 305). *Analytic Geometry*.—Designed for engineers. Only one of the following may be counted: Mathematics 305E, 305, 305K; Applied Mathematics 305; Pure Mathematics 302, 302K. Prerequisite: Mathematics 301E and 204E, or Applied Mathematics 204 and 309Q. Three lectures a week for one semester.

305K (P.M. 302K). *Number Analysis and Analytic Geometry*.—Only one of the following may be counted: Mathematics 305K, 305, 305E; Applied Mathematics 305; Pure Mathematics 302, 302K. Prerequisite: One of the following: Mathematics 301, 301E, 304, 304K; Pure Mathematics 301, 301K, 304. Three lectures a week for one semester.

306 (P.M. 303). *Second Course in Analytic Geometry*.—Prerequisite: Mathematics 305, 305E, or Pure Mathematics 302. Three lectures a week for one semester. (Not given in 1953–1954.)

309 (P.M. 305). *Solid Geometry*.—May not be counted by students who have admission credit in solid geometry unless their total number of acceptable admission units exceeds fifteen (however, see "Surplus Admission Units" in the General Information bulletin). An extension of classical Euclidean geometry to three dimensions. Lines and planes, polyhedra, cylinders, cones, spheres, etc. Prerequisite: A high-school course in plane geometry. Three lectures a week for one semester.

613 (P.M. 613). *Calculus*.—Only one of the following may be counted: Mathematics 613, 613E; Applied Mathematics 613; Pure Mathematics 613. Counts as three advanced hours if preceded by nine hours of mathematics, or as six advanced hours if preceded by twelve hours of mathematics. Prerequisite: Analytic geometry. Three lectures a week for two semesters.

613E (A.M. 613). *Calculus*.—Designed for engineers. Only one of the following may be counted: Mathematics 613E, 613; Applied Mathematics 613; Pure Mathematics 613. May count as three advanced hours if preceded by nine hours of mathematics, or as six advanced hours if preceded by twelve hours of mathematics. Prerequisite: Analytic geometry. Three lectures a week for two semesters.

315 (A.M. 311, P.M. 315). *Theory of Equations*.—Prerequisite: Analytic geometry. Three lectures a week for one semester.

316 (P.M. 308). *Elementary Mathematical Statistics*.—Graphical presentation, frequency functions, distribution functions, averages, variance, standard deviation, curve-fitting, and related topics. Prerequisite: Six hours of mathematics. Three lectures a week for one semester.

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317 (P.M. 317). *Higher Algebra*.—An intensive course in algebra, including permutations and combinations, interest and annuities, limiting values, convergence and divergence of series, summation of series, probability, theory of determinants, and other topics which cannot be fully covered in college algebra. Prerequisite: Six hours of mathematics, including Mathematics 301 or Pure Mathematics 304. Three lectures a week for one semester. (Not given in 1953–1954 or 1954–1955.)

219 (P.M. 219). *Problems Course for Actuarial Examination, Part 2*.—Problems and supplementary instruction in algebra, trigonometry, analytic geometry, and calculus. Designed to develop ability in problem solving and to aid students in preparing for Part 2 of the examinations required for membership in the Actuarial Society of America. Prerequisite or parallel: Mathematics or Pure Mathematics 301. Two lectures a week for one semester. Mr. Lane. (Not given in 1953–1954 or 1954–1955.)

For Undergraduates and Graduates

220 (P.M. 220). *Problems Course for Actuarial Examination, Part 3*.—Problems and supplementary instruction in finite differences, probability, and mathematical statistics. Designed to develop ability in problem solving and to aid students in preparing for Part 3 of the examinations required for membership in the Actuarial Society of America. Prerequisite or parallel: Mathematics 645, 678, and 301L; or Pure Mathematics 645, 646, and 340L. Two lectures a week for one semester. Mr. Lane. (Not given in 1953–1954 or 1954–1955.)

Any of the following junior courses in mathematics may count as senior courses if preceded by six hours of advanced mathematics.

321K (P.M. 321K). *Advanced Calculus*.—Designed to develop ability to understand and solve problems. Approximations, limits, functions, derivatives, and integrals. Prerequisite: Six hours of calculus. Three lectures a week for one semester.

321L (P.M. 321L). *Advanced Calculus*.—Continuation of Mathematics 321K. Functions defined by integrals, expansions for functions, multiple integrals, applications. Prerequisite: Mathematics or Pure Mathematics 321K. Three lectures a week for one semester.

322K (A.M. 322K, P.M. 322K). *Differential Equations and Applications*.—Prerequisite: Six hours of calculus. Three lectures a week for one semester.

322L (A.M. 322L, P.M. 322L). *Differential Equations and Applications*.—Prerequisite: Mathematics 322K, Applied Mathematics 322K, or Pure Mathematics 322K. Three lectures a week for one semester.

624 (P.M. 624). *Introduction to the Foundations of Analysis*.—Prerequisite: Six hours of calculus and consent of instructor. Three lectures a week for two semesters. Mr. Moore.

325 (A.M. 325). *Advanced Calculus with Engineering Applications*.—Prerequisite: Six hours of calculus. Three lectures a week for one semester.

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326 (A.M. 326). *Differential Equations with Engineering Applications*.—Prerequisite: Six hours of calculus. Three lectures a week for one semester.

327 (P.M. 327). *Ruler and Compass Constructions*.—Prerequisite: Twelve hours of mathematics. Three lectures a week for one semester. (Beginning in 1954-1955, combined with Mathematics 328 and 333 and given as two three-hour courses, Mathematics 333K and 333L.)

330K (A.M. 330, P.M. 630a). *Advanced Analytic Geometry of the Euclidean and Projective Planes*.—Analytic methods of homogeneous and line coordinates as applied to the real and complex domains of metric and projective geometries of the plane and space. Prerequisite: Six hours of calculus. Three lectures a week for one semester. Mrs. Porter. (Not given in 1954-1955.)

331 (P.M. 326). *Introduction to the Foundations of Geometry*.—Prerequisite: Twelve hours of mathematics. Three lectures a week for one semester. Mr. Moore.

333 (P.M. 333). *Teaching Problems in Mathematics*.—Prerequisite: Twelve hours of mathematics. Three lectures a week for one semester. (Beginning in 1954-1955, combined with Mathematics 327 and 328 and given as two three-hour courses, Mathematics 333K and 333L.)

333K. *Teaching Problems in Arithmetic and Algebra*. Basic ideas and the method of presentation of these concepts in the grades and high school. Prerequisite: Twelve hours of mathematics. Three lectures a week for one semester. Mr. Ettlenger. (Prior to 1954-1955, given as a part of Mathematics 327, 328, 333.)

333L. *Teaching Problems in Geometry*.—Basic ideas of plane and solid geometry; ruler and compass constructions; representation of space objects by plane projections; use of these ideas in teaching plane and solid geometry. Prerequisite: Twelve hours of mathematics. Three lectures a week for one semester. (Prior to 1954-1955, given as a part of Mathematics 327, 328, 333.)

340 (A.M. 340, P.M. 340). *Interpolation and Graphical Methods*.—Nomographic charts, empirical formulae, operation with symbols, interpolation both direct and indirect, approximate or numerical integration. Includes study of advancing, central, and divided differences. Prerequisite: Three hours of advanced calculus, or Mathematics or Pure Mathematics 219 and six hours of calculus. Three lectures a week for one semester. Mr. Greenwood.

340L (P.M. 340L). *Interpolation and Numerical Methods*.—Continuation of Mathematics 340. Prerequisite: Mathematics, Applied Mathematics, or Pure Mathematics 340; or twelve hours of advanced mathematics. Three lectures a week for one semester. Mr. Greenwood.

645 (P.M. 645). *Probability*.—May count as business administration. Principles underlying statistical inference, including probability distributions, chance variables, conditional probabilities, and expected values. Prerequisite: Six hours of calculus. Three lectures a week for two semesters. Mr. Lane.

361 (A.M. 361). *Theory of Functions of a Complex Variable*.—Prerequisite: Mathematics 321L, or 322L, or 325 and 326 or the equivalent. Three lectures a week for one semester. Mr. Cooper.

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382 (A.M. 641, P.M. 641, and A.M. 380K and 380L). *Analytical Mechanics*.—Prerequisite: Six hours of advanced mathematics including three hours of advanced calculus or differential equations. Three lectures a week for two semesters. (Not given in 1954-1955.)

364K (A.M. 364K). *Vector and Tensor Analysis*.—Prerequisite: Mathematics 321L, or 322L, or 325 and 326, or the equivalent. Three lectures a week for one semester. Mr. Craig.

364L (A.M. 364L). *Vector and Tensor Analysis*.—Prerequisite: Mathematics or Applied Mathematics 364K. Three lectures a week for one semester. Mr. Craig.

667 (P.M. 670). *Introduction to Modern Projective Geometry*.—Only one of the following may be counted: Mathematics 667; Pure Mathematics 670, 630. Prerequisite: Six hours of advanced mathematics. Three lectures a week for two semesters. Mr. Lubben.

368 (A.M. 368). *Advanced Numerical Analysis*.—Solution of various mathematical problems by numerical approximation, relaxation methods, inversion of matrices, etc.; mechanical and electrical computational aids. Prerequisite: Six hours of advanced mathematics. Three lectures a week for one semester. Mr. Greenwood. (Not given in 1953-1954.)

669 (A.M. 669). *Mathematical Analysis for Advanced Physical Chemistry*.—Prerequisite: Mathematics 322L, or 325 and 326, or the equivalent. Three lectures a week for two semesters. Mr. Prouse.

370 (A.M. 370K and 370L). *Fluid Dynamics*.—Primarily for engineers. (1) Perfect fluids: conformal mapping, Schwarz-Christoffel transformation, Kutta-Joukowski profiles, vortex motion; (2) viscous fluids: boundary layers, the Laman trail; (3) dimensional analysis. Prerequisite: Mathematics or Applied Mathematics 361. Three lectures a week for two semesters. Mr. Greenwood. (Not given in 1953-1954 or 1954-1955.)

337K (P.M. 337K). *Topics in Modern Algebra*.—Prerequisite: Six hours of advanced mathematics. Three lectures a week for one semester. Mr. Lubben.

337L (P.M. 337L). *Topics in Modern Algebra*.—Prerequisite: Six hours of advanced mathematics. Three lectures a week for one semester. Mr. Lubben.

323 (P.M. 323). *Introduction to the Foundations of Algebra*.—Prerequisite: Six hours of advanced mathematics. Three lectures a week for one semester. Mr. Lubben. (Not given in 1953-1954 or 1954-1955.)

372 (A.M. 372). *Boundary Value Problems*.—A treatment of the boundary value problems connected with the important differential equations of mathematical physics. Prerequisite: Mathematics 322L, or 325 and 326, or the equivalent. Three lectures a week for one semester. Mr. Greenwood.

373K (A.M. 373K, P.M. 336). *Introduction to Abstract Algebra and Number Theory*.—The fundamental operations with integers, discussion of primes, divisibility, and congruences; introduction to the study of modern algebra and number theory. Prerequisite: Six hours of advanced mathematics and a certain aptitude for abstract mathematical thinking. Three lectures a week for one semester. (Not given in 1953-1954 or 1954-1955.)

373L (A.M. 373L). *Introduction to Abstract Algebra and Number Theory.*—Prerequisite: Mathematics or Applied Mathematics 373K. Three lectures a week for one semester.

374 (A.M. 374). *Fourier and Laplace Transforms.*—Prerequisite: Mathematics 322L, or 325 and 326, or the equivalent. Three lectures a week for one semester. Mr. Guy.

374K (A.M. 374K). *Fourier and Laplace Transforms.*—Continues the development of the theory and applications of various integral transforms begun in Mathematics 374. Prerequisite: Mathematics or Applied Mathematics 374. Three lectures a week for one semester. Mr. Guy.

375 (A.M. 375). *Conference Course.*—May be repeated for credit. Prerequisite: Senior standing in mathematics and consent of instructor.

676 (A.M. 676). *Functions of Several Real Variables.*—Introduction to the fundamental processes in mathematics needed for work in modern applied mathematics. Prerequisite: Mathematics 321L, or 322L, or 325 and 326, or the equivalent. Three lectures a week for two semesters. Mr. Guy.

678 (P.M. 646). *Mathematical Statistics.*—May count as business administration. Distribution functions, averages, curve-fitting methods, correlation, functions of chance variables, applications to sampling problems. Prerequisite: Six hours of advanced mathematics. Three lectures a week for two semesters. Mr. Lane.

679 (P.M. 647). *Actuarial Mathematics.*—May count as business administration. Compound interest, mortality tables, values of sets of payments, premium rates, policy values, dividends. Prerequisite: Six hours of advanced mathematics. Three lectures a week for two semesters. Mr. Lane.

For Graduates

630 (A.M. 690, P.M. 380). *Theory of Groups.*

381L (A.M. 381L), 381M (A.M. 381M). *Applications of Tensor Analysis.*

382 (A.M. 377). *Mathematical Theory of Strategy.*

382M (P.M. 383M). *Sampling Theory.*

683 (P.M. 683). *Theory of Functions of Real Variables.*

684 (A.M. 384, P.M. 684). *Analytic Functions.*

684M (P.M. 685). *Infinite Processes.*

686 (P.M. 686). *Functional Analysis.*

387 (A.M. 387). *Group Theory of Differential Equations.*

688 (P.M. 688). *Foundations of Mathematics.*

689 (P.M. 689). *Point Sets and Continuous Transformations.*

690 (P.M. 690). *Research in Point-Set Theory.*

391L (A.M. 393), 391M (A.M. 394). *Potential Theory.*

692 (A.M. 692, P.M. 692), 692M. *Partial Differential Equations.*

696 (P.M. 696). *Integral Equations.*

697L (P.M. 697L). *Continued Fractions.*

698. *Thesis.*

699. *Dissertation.*

ASTRONOMY

For Undergraduates

308. *Descriptive Astronomy.*—Three lectures a week for one semester. Prouse.

309. *Descriptive Astronomy.*—Three lectures a week for one semester. Prouse.

310. *Physics of the Stars.*—Physical conditions in the sun and other stars; the methods of determining them; energy sources within stars; the evolution of stars. Prerequisite: Three hours of college algebra and trigonometry. Three lectures a week for one semester. Mr. Edmonds.

For Undergraduates and Graduates

620. *Practical Astronomy.*—Lectures, with practical work with sextant, transit telescope, and equatorial telescope. Prerequisite: Calculus and junior standing. Three lectures a week for one semester. Prouse.

322. *The Solar System.*—Solar physics and radio astronomy; the sun and satellites; comets, meteors and interplanetary matter. Emphasis on conditions and problems of origin and evolution. Prerequisite: Calculus and six hours of advanced mathematics. Three lectures a week for one semester. (Not given in 1953-1954 or 1954-1955.)

355. *Astrophysics.*—Astronomy 355 and Physics 343 may not be taken together. Astronomical photometry, spectroscopy and spectrophotometry; spectroscopic and eclipsing binaries; variable stars; interstellar dust. Emphasis on observational techniques and results. Prerequisite: Physics 812 and six hours of calculus. Three lectures a week for one semester. Mr. Edmonds.

357. *Galactic Structure and Extragalactic Nebulae.*—Stellar populations, radio astronomy and other techniques for determining structure of our galaxy; stellar populations; properties of extragalactic nebulae and cosmogony. Prerequisite: Astronomy 355. Three lectures a week for one semester. Mr. Edmonds. (Not given in 1953-1954 or 1954-1955.)

360. *Celestial Mechanics.*—Prerequisite: Mathematics or Applied Mathematics 325 and 326. Three lectures a week for one semester. Mr. Prouse.

361. *Theoretical Astrophysics.*—Excitation, ionization, opacities; stellar atmospheres; stellar structure, energy sources; the evolution of stars; the physics of extended atmospheres, nebulae and galaxies. Prerequisite: Astronomy 355 and Physics 339. Three lectures a week for one semester. Mr. Edmonds. (Not given in 1953-1954 or 1954-1955.)